EDITORIAL.

ON KEYS AND DICHOTOMIES.

"The voice of one crying in the wilderness."

On occasion, we have remarked on keys and dichotomies, their purpose and form. Again we inquire.

Of course, our (profane) familiarity is with the writings of hemipterists; and perhaps we generalize from insufficient data. But, while we do not employ critically keys in other orders, our editorial labors bring them forcibly to our notice.

What is the purpose of a key? Is it a form of puzzle to sharpen the lagging wits of entomologists? Is it a vehicle for erudition to confound the unlearned? Or is it a thing for concrete and exact use?

There is only *one* fundamental purpose for any key in any biological assemblage of forms, whatsoever that may be—that purpose is to make known to the user of the key what has heretofore been unknown to him. A key should deal only with concrete, positive, fundamental structures, with positive visible differential characters; not with tenuous abstractions, nor with ifs, buts, or ands. No key should say

"Wider and more pilose .....*smithii*
Narrower and thinner pile .....*robinsonii.*"

If we have in hand either of the species, and don't know the other, where are we? And if we happen to have an aberrant specimen of either, again, where are we?

The underlying assumption in many keys is that the user has numerous species and specimens before him and that by concentrated study he has absorbed the limitations of the characters and the general facies of the group; whereas, in fact, keys are used to determine unknown specimens, far too often singletons, which are not within the knowledge of the user of the key. And even when it comes to positive characters, an intensive worker in any group acquires a vast discrimination of subtle and far too frequently elusive characters, characters discernible only under certain conditions of light or under certain magnifications. And the author mentions neither! The writer has seen ocelli where none should be—a different angle of light and lo! they were obviously circular, shiny deep pits. This can happen to any one of us. Our remedy is correlated, positive, structural characters of demonstrated stability; and where these should be variable, to indicate numerically their variation.

And we must not forget that dimensions are positive key characters, just as much so as antennal proportions or genitalic structure, or armature, or any other structural feature.

Let us next look into the form of a key. How often have we seen indented keys of great length, in which the last lines taper down to the vanishing point, like "The Tale of a Mouse" in Alice in Wonderland! And some such keys have not even letters by which to identify corresponding indents! This is left to the natural ingenuity of the user! Such keys are hard to use, confusing, and very wasteful of fair white paper. How often have we seen keys in which occurs the good old phrase, "if not so, then"? Or again, a key which leads to three or more closely related species, which are simply set off more or less descriptively, one under the other? Or perhaps one of these "A—AA" keys, where the alphabet is exhausted and the author has recourse to a whole galaxy of mathematical symbols or astronomical signs, like an astrologer's mantle? (Editors have been known to receive pointed requests to print such aberrations as submitted, in all their glory!)

There are many rumblings about on the theme that biology is as much an exact science as, say, mathematics or chemistry. But no one seems to apply such exactness to descriptive entomology and far less to the construction of keys. Of course, the great deterrent is exactness—a little thing that demands high discriminating talent, much labor and a fixed and exact use of a concrete and invariable terminology. It also calls for the rejection of all vague and wordy subjective concepts in favor of exact terse objective actualities. When a writer says "more rounded" he introduces a subjective norm of his own, unapprehended by his reader; or else, he begs the question and sets two unknown things one against the other, which is far from exactness.

The best device to overcome these weaknesses is a key in the form of a pure dichotomy, with serially numbered couplets. The couplets, of course, to be on the "yes" and "no" plan, *i.e.*,

1.–"Ocelli present 2
Ocelli absent ..... 3"

Such a precise statement leaves nothing open to interpretation. It is or it isn't. And so on through, omitting all comparatives, all "antennae longer," "antennae shorter"; "insect broader," "insect narrower." In fact, all comparative dimensions should be susceptible of numerical treatment, as for instance, "length : breadth : : 5 : 3"; "antennal joints I : II : III : IV : : 7 : 11 : 5 : 14." Or again, when we come to color—and only such colors as are fixed and un-

fluctuating characteristics of species or group,—it is one thing to say "piceous" and quite another "black approaching piceous"—all the difference between definiteness and vagueness. Few people have such a fine color-sense, and even they cannot see the identical color under varying conditions of light, either as to source, quality or angle.

These are but a few of the vague moments in keys; and just an idea as to how they may be corrected. Doubtless our readers can supply each his own horrible example of a key.

In brief, our argument and our plea are these: Keys are strictly for use in determining the unknown by persons relatively unfamiliar with the matter in hand. Keys should therefore be cast as pure dichotomies with numbered couplets, employing only positive, objective, visible characters, without any loose wording or comparatives. J. R. T.-B.

METHODS AND TECHNIQUE.

Notes on Collecting Diptera.

When we confine our interests to one particular group of insects we are apt to find that certain methods of collecting those insects are better than others. The writer found this to be true while collecting Diptera on the Pacific Coast. Perhaps some of these methods might be of interest to others.

A Net for Capturing Insects Resting on Tree Trunks.—Many western Asilidae, particularly of the genus Cyrtopogon, rest habitually upon the trunks of standing trees. Some species are easily captured with an ordinary net because once the net is over them, they fly upward and into the tip. Others fly only a short ways upward and then downward, escaping from beneath the ring because it cannot rest flat against the rounded surface of the tree trunk. The following sort of a net increased the number of downward-flying specimens captured by at least fifty per cent.

An oval-shaped ring, $2\frac{1}{2}$ inches wide and 7 inches long, was made. The shank was fastened to a bamboo handle 30 inches long, and then bent at a right angle to the handle. A cone-shaped net 18 inches long was sewed to the ring. The net was kept spread open by a string from the tip which was tied to the handle. Once such a net is placed over a specimen, usually with the long axis parallel to the long axis of the tree trunk, the insect has no chance to escape because the entire ring fits snugly against the curved surface, particu-